

SUBMARINE DEVELOPMENT RAPID IN UNITED STATES

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Inventor Holland's First Submarine Was Bought by the United States Navy—History of Submarine Now Being Made in European Conflict

For centuries, history tells us, man has aspired to travel in the third dimension—to navigate the air, imitating the bird, and to travel beneath the water, imitating the fish. These ideas are, therefore, not new, and many attempts to accomplish these feats have been made. But it was reserved for the present generation to see these attempts finally crowned with practical success.

It is a fact that the credit for these two achievements belongs to the Wright brothers, who were the first successful aviators, and to the late John P. Holland, who designed and built the first successful modern submarine.

Holland's first submarine, which was very properly named the "Holland," was purchased by the United States Navy after thorough tests which fully demonstrated the practicability of his device. The secret of Holland's success was that he was the first to apply to an underwater craft the electric storage battery and motor for submerged propulsion and the internal combustion engine for surface propulsion.

The complete story of the development of the submarine in the United States is a story of interest and romance, but space will not permit of entering into the details. Briefly, the pioneer company was formed and was known as the "Holland Torpedo Boat Company." It was this company which built the Holland, and her immediate successors, which are still in service and are known as the "A" boats. The original Holland company belongs the credit of developing and introducing, against heavy obstacles, this modern type of warfare, which has only recently demonstrated to the world its vital importance. One of the greatest obstacles with which the Holland company had to contend was natural conservatism, accompanied in some cases by ignorance and prejudice, affecting these forces there was happily for the industry a large amount of encouragement given by certain officers of the navy and also by broad minded, far seeing business men.

As the development of the submarine grew the Holland Company was purchased and merged into the Electric Boat Company, headed by the late L. B. Rice, who invested in the enterprise a large part of his private fortune. With the additional financial backing thus obtained the Electric Boat Company enlarged its field of operation to include not only the United States, but some of the principal countries of the world. At the same time the Electric Boat Company undertook to perfect and enlarge its technical organization. The services of L. V. Spear, then a naval constructor in the United States navy, were secured, and from that time the present Mr. Spear has been the head of the technical organization. To him belongs the credit for the consistent logical development which has taken place during the past ten years and which has now reached a stage which surpasses even the most sanguine hopes of the original promoters. From time to time the technical staff of the Electric Boat Company has been augmented until today it is the largest of its kind in the world and contains the very best talent available. The technical nature of the work was such that it was found desirable to draw on the navy, on the leading shipyards and the graduates of the highest grade of technical institutions. The home staff of the company at present comprises seven ex-naval officers, of which three were naval constructors, and the rest belonged to the line. It also includes over 100 engineers and draughtsmen, who represent the highest order of talent in various branches of engineering, such specialties as internal combustion engines, storage batteries and electric machinery. All of these technical experts are kept exceedingly busy, because as time goes on the rate of development proceeds faster. As the size of the vessels is increased new problems have to be met and overcome. New requirements arise from time to time and these also have to be made the subject of investigation and experiment, reduced to practical basis and incorporated in new schemes of boats. The organization of the Electric Boat Company is now worldwide, having branches in most of the principal foreign countries, but the centre of gravity is in the United States and practically all of the technical staff are Americans. So that while over half of all the submarines in the world are com-

monly known as Hollands their origin may be traced to the United States. As soon as the submarine was demonstrated to be a practical success some of the larger European nations took it up with great earnestness and built submarine fleets far surpassing in size that of the United States. Yet so far as needs were concerned, the extent of the coast line to be protected, the United States should logically have had a submarine fleet far exceeding in numbers those of any foreign power. Not only does the United States need such large numbers on account of the great extent of coast line to be protected, but also on account of its policy of defence rather than aggression. The submarine is preeminently the type of vessel for this purpose.

The following table has been prepared to show the rate at which submarines have been acquired by the United States navy.

Year	No. of boats for year	Displacement, tons	Aggregate displacement, tons
1897	1	74	74
1898	1	61	135
1899	1	72	207
1900	1	107	314
1901	1	107	421
1902	1	107	528
1903	1	107	635
1904	1	107	742
1905	1	107	849
1906	1	107	956
1907	1	107	1063
1908	1	107	1170
1909	1	107	1277
1910	1	107	1384
1911	1	107	1491
1912	1	107	1598
1913	1	107	1705
1914	1	107	1812
1915	1	107	1919
1916	1	107	2026

At a time like the present, when the greatest war in the world's history is being waged and when the United States is giving serious thought to the problem of defence, there are many military and naval questions which should be very carefully considered. At the beginning of the war experts held certain theories which have since been entirely upset. Many prophecies have been made only to be belied by actual events. Of all the various military and naval problems, that of the submarine has probably been the most fraught with interest and most generally discussed.

At the outset of the war the submarine was practically an unknown quantity to the general public. In the naval service it had its staunch supporters as well as opponents. The fact was that it was an untried weapon, having never been actively employed in any of the preceding wars. For this reason there was room for a difference of opinion among technical people. But now that the war has been in progress for nearly a year and a half we have a vast amount of information available. Yet in spite of this we find differences of opinion as regards the submarine. Certain articles have recently appeared in print, evidently inspired and intended to discredit the submarine. In some cases the articles referred to are grossly exaggerated, while others appear sincere and express conclusions rather hastily arrived at. But whether sincere or deliberately misleading, the question of the proper defence of the United States is now of such vital importance that the subject should be viewed clearly and dispassionately to avoid what may later prove to be a fatal mistake.

Probably the most important question before Congress today is that of the naval programme for defence. The Secretary of the Navy has been quoted as stating in substance that the pendulum of expert opinion which not long ago swung toward a large submarine programme has now swung in the opposite direction, in favor of a large fleet of dreadnoughts. This statement if true would indicate a rather weak and vacillating attitude on the part of naval experts, as the facts thus far developed would seem to offer no valid reason for such sudden and extreme swings of the pendulum. When the mariner's needle swings he generally averages the extreme of the oscillations to find his true course. In this question of naval defence the truth probably lies somewhere between the extremes.

The very important question is whether or not a large submarine building programme is a necessity for the United States. To properly answer this it will be necessary to review the main facts of the naval history of the war, to show the causes of the various swings of expert naval opinion and to finally apply the known facts to the actual conditions so far as the United States is concerned.

During the early stages of the war the submarines were extensively used by both England and Germany for scouting and reconnoitring. But the principal actions were between cruiser squadrons—in the North Sea, off Chile and off the Falkland Islands. The submarine did

not appear on the first pages of the newspapers until one of the smaller U-boats of Germany in one morning sank three of England's large armored cruisers, the Aboukir, the Cressy and the Hogue, with a loss of 1,500 men. Then followed the German submarine campaign against British commerce, culminating in the destruction of the Lusitania, and resulting in the loss of about 8 per cent of England's entire merchant marine. It was about this time that public opinion was convinced of the importance of the submarine and when the pendulum of expert naval opinion swung to a large submarine programme. While the German submarines were busy around the British Islands, England was also busy providing means to protect her warships and her commerce from the raiders. She soon learned to keep her valuable warships bottled up so that the submarines could not reach them. She invented, experimented and spent vast sums on means of defence.

While she had all along had command of the surface of the sea she was at first powerless to attack below the surface. She put into service large numbers of fast armed vessels. Miles of huge steel nets were built and planned in various strategic points. Aeroplanes were used as scouts. Lookouts were stationed at every available observation point. The thousands of armed surface vessels swarming about her coast arranged signals and could concentrate in large numbers and any particular zone at any time. The hunting of German submarines then became the greatest of English naval sports.

England is using her submarines to advantage—she has had them in the Sea of Marmora and right in the harbor of Constantinople. It is reported that a Turkish fleet of transports has been practically annihilated. On the Baltic the British and Russian submarines have been very active, much to the discomfort of Germany. On this sea Germany has lost many war vessels as well as merchant ships. Her failure to capture Riga is ascribed entirely to the submarines.

Applying facts gained from the Euro-

pean war to the defence of the coast of the United States it is seen that it would be impossible for any country or the combined countries of the world to send to our coasts a fleet of armed surface vessels sufficient to annoy our submarines acting on the defensive. Such small, high speed vessels could not operate so far from a base. Even if they could reach our coasts there are not a sufficient number in the world to so cover the water as to act effectively. Even if they could reach our coast in sufficient number they would have to be protected against our surface naval vessels. As for setting traps off our coast, this is also unthinkable. The conditions here are absolutely the reverse of what they are around England. Any conclusion based on the present known facts in connection with the British-German submarine situation is at once absurd when applied to the defence of the United States by submarines.

Without an adequate submarine defence we would be with our present navy at the mercy of any first class naval power. This has been demonstrated by recent naval maneuvers. Last October, when the Atlantic fleet went out to meet a constructive enemy, our ships were pronounced by the umpire to have been lost, and a strong enemy fleet conveying a large army on transports steamed victoriously into Delaware Bay. A sufficient number of submarines stationed in that bay would have effectively prevented a landing. Dreadnoughts cost so much and it takes so long to build them that it will be a physical impossibility to secure enough of these vessels within the time they may be needed.

A modern dreadnought costs \$15,000,000. A submarine costs about \$500,000; so thirty submarines can be built for the price of one dreadnought. It requires three to four years to build a battleship or battle cruiser. A fleet of submarines can be built in from six to ten months.

If the war in Europe has taught us nothing else, it has thoroughly demonstrated the absolute necessity for an adequate submarine fleet for coast defence.

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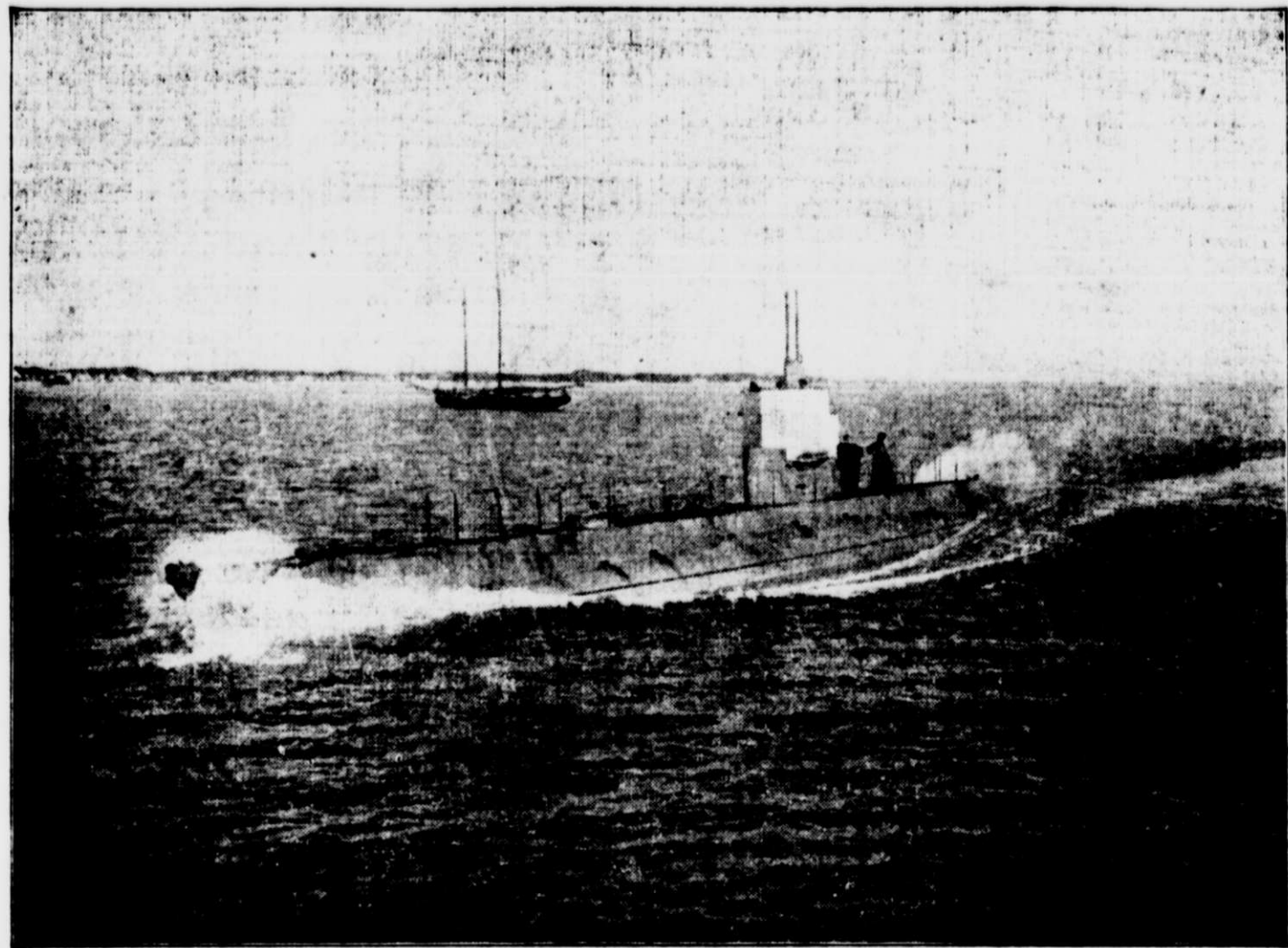
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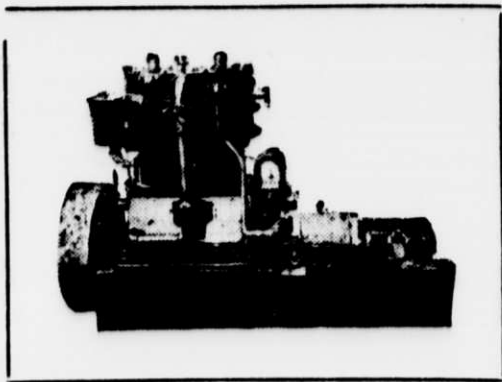
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